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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Stefan Schneweis

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EXAMINER

MILLER, MICHAEL G

ART UNIT

PAPER NUMBER

1712

MAIL DATE

DELIVERY MODE

05/12/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/581,739	Applicant(s) SCHNEWEIS, STEFAN	
	Examiner MICHAEL G. MILLER	Art Unit 1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15, 18 and 20-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15, 18 and 20-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input checked="" type="checkbox"/> Other: <u>Two NPL Documents - McHugh and CARBON Archive.</u> |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

- 1) A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 23 FEB 2010 has been entered.

Response to Amendment

- 2) The amendment filed 23 FEB 2010 has been entered. As a result of the amendment Claims 15, 18, and 20-23 are pending, Claim 15 is amended, and Claim 23 is new.

Response to Arguments

- 3) Applicant's arguments filed 23 FEB 2010 have been fully considered but they are not persuasive.
- 4) In response to Applicant's argument that the thickness of the carbon structure in the prior art precludes it from being used as a support in a gas treatment system, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Applicant has provided no evidence to the contrary, instead asserting a belief. Examiner notes that the substrate must inherently be capable of

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supporting its own weight and also notes that carbon fiber is known for having a strength/weight ratio greater than unity, which means it can support more than its own weight. If it can support more than its own weight, it is capable of supporting an object other than itself and can therefore be used as a support.

- 5) In response to Applicant's argument that Christner does not teach a felt, non-woven material or fabric, Examiner respectfully disagrees and references the mat mentioned by Applicant on Page 5. The mat is a tangled, non-woven agglomeration of fibers and is therefore considered to be a felt.)
- 6) In response to Applicant's argument that Carroll is intent on teaching a method to close the pores of its preform, thus teaching away from the claimed invention, Examiner respectfully disagrees. Carroll does teach a densification process, but the statement of the invention teaches that the densified structure still contains pores which contain a graded carbon-ceramic composition (Column 3 Lines 50-57). If the densified structure still contains pores, it is still porous and would therefore be analogous to Christner.
- 7) In response to Applicant's argument that Sekhar does not disclose treatment of a porous material, Examiner respectfully disagrees. Applicant has shown no proof whatsoever that any of the treatment methods which are alleged as indicia of a solid substrate cannot be performed on a porous substrate. By way of example, dipping a porous structure into a liquid to draw the liquid into the pores is a common household operation (a sponge). Similarly, there is no evidence on the record that sandblasting, pickling, dipping or spraying operations can only be performed on solid, non-porous passages. Still

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further, the argument does not address the limited purpose for which Sekhar is cited. Sekhar is cited merely to show a recognized problem of oxidation in the formation of carbon anodes (such as Christner). Carroll and Bernard are cited as showing solutions to this recognized problem.

- 8) In response to Applicant's argument that Bernard teaches away from Christner, Examiner respectfully disagrees. Bernard's method, exemplified by Claim 1, calls for continual passage of liquid through the object to be densified in order that the densification powder may be deposited. If the liquid continues to be forced through the substrate, the substrate must inherently have pores through which the liquid can pass.
- 9) With regards to Claim 23, Christner et al teaches the use of pitch fibers, which are produced by a high-temperature carbonization process. Therefore the non-woven material, which are the chopped carbon fibers and the mat formed therefrom, are converted from pitch to carbon fibers by high-temperature carbonization.

Claim Rejections - 35 USC § 102

- 10) The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

- 11) Claims 15, 18 and 21-22 rejected under 35 U.S.C. 102(b) as being anticipated by Christner et al (U.S. Patent 4,115,528, hereinafter '528).

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12) Claim 15 – '528 teaches a method for forming a gas permeable substrate, the substrate comprising carbon and having pore channels for carrying gas interspersed through the substrate (Abstract, Column 2 Lines 26-31), the substrate having a first lateral surface and an opposite lateral surface (Column 4 Lines 31-35), comprising the steps of:

- a) Obtaining a framework formed of a non-woven material and made of carbon fibers (Column 4 Lines 31-35); and
- b) Stabilizing the framework by at least one of vapor and/or fluid impregnation with at least one pyrocarbon and/or silicon carbide coating that forms a matrix, such that the stabilized framework has a porosity level that forms the pore channels (Column 4 Lines 41-46),
- c) Said pore channels being disposed between the first lateral surface and the opposite lateral surface, and opening onto the first lateral surface and the opposite lateral surface, to enable gas flow from the opposite lateral surface to the first lateral surface for treatment of the object by the gas which has passed through the pore channels (inherent: given the ratio of thickness to surface area and the porosity obtained in Example 1, the pore channels will connect the opposing lateral surfaces).

13) Claim 18 – The framework is stabilized solely with carbon (Column 4 Lines 43-46, carbonization treatment).

14) Claim 21 – The substrate has 85% porosity (Column 4 Lines 51-55).

15) Claim 22 – The treated fibers form a thin, uniform layer (Column 4 Lines 31-34).

Claim Rejections - 35 USC § 103

16)The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17)The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

18)Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over '528 in view of Sekhar et al (U.S. Patent 6,455,107, hereinafter '107), Bernard et al (U.S. Patent 5,352,484, hereinafter '484) and Carroll et al (U.S. patent 5,397,595, hereinafter '595).

19)Claim 20 – '528 is silent as to forming graded compositions of carbon / silicon carbide coating material. '107 teaches that it is known to use carbonaceous materials as anodes in electrical systems, but that they have a poor resistance to oxidation which limits their use in this area (Column 1 Lines 20-37). '484 teaches a method of liquid infiltration of porous carbon substrates wherein submicron carbon powder is forced into a substrate by fluid infiltration (Column 3 Line 55 – Column 4 Line 17). It further teaches adding oxidation

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inhibitors to the carbon powder (Column 5 Lines 7-17) which include silicon carbide and teaches that the resin may also be introduced with the carbon powder (Column 5 Lines 18-25). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have combined the methods of '528 and '484, in light of the teaching of '107, as both methods want to provide carbonaceous coatings on carbon fiber preforms, '107 teaches that carbonaceous materials used as anodes suffer from low resistance to oxidation, and '484 teaches that the addition of silicon carbide adds an advantageous oxidation resistance property. '528/'107/'484 are silent as to forming a graded carbon/silicon carbide composition. '595 teaches that silicon carbide coatings applied to a carbon substrate only provide limited oxidation resistance property owing to cracking and peeling (Column 2 Lines 39-44) and teaches a method for forming a graded carbon/silicon carbide layer on a carbon substrate (Column 5 Lines 26-46) with an eye towards improving the bond between the coating and the fiber surface (Column 2 Lines 64-67) which will inherently improve the resistance to peeling and cracking and therefore will improve the oxidation resistance of the substrate. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have combined the methods of '528/'107/'484 and '595, as both methods want to form a coating containing carbon and silicon carbide on the surface of a porous carbon substrate using fluid impregnation and '595 teaches that using a

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variable composition impregnation medium allows for a graduated coating to be formed which allows for better adhesion of the coating to the substrate.

20) Claim 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Christner et al (U.S. Patent 4,115,528, hereinafter '528) in view of McHugh ("The Development of Orientation in Mesophase Pitch During Fiber Formation", John J. McHugh and Dan D. Edie, 22nd Biennial Conference of the American Carbon Society, 17 July 1995).

21) Claim 23 – '528 teaches every limitation of Claim 15 except that the non-woven material is converted to carbon fibers by high-temperature carbonization. As discussed above, '528 teaches that pitch fibers are used in the manufacture of the non-woven material. McHugh teaches that pitch fibers are formed by high-temperature carbonization of pitch strands (first paragraph of introduction); further, '528 teaches a high-temperature carbonization step in the above-cited material which will carbonize any unreacted core material based on pitch fibers. Therefore it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have combined the teachings of '528 and McHugh, as '528 teaches the use of pitch fibers to form a non-woven carbon fiber mat and McHugh teaches that the pitch fibers are pitch strands converted to carbon fibers via high-temperature carbonization.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL G. MILLER whose telephone number is (571)270-1861. The examiner can normally be reached on M-F 9-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael G. Miller/
Examiner, Art Unit 1712

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1712